README FOR STEREO PLASTIC IRON ABUNDANCE AND KINETIC DATA FILES Last Update: July 15, 2010 (ABG, LBE)

DATA USAGE:

Data provided by the PLASTIC team at the University of New Hampshire under NASA contract NAS5-00132.

Iron data provided here are courtesy of A. Galvin and L. Ellis.

These data are delivered to the public domain as soon as possible. Efforts are made to include the latest known calibrations and efficiencies; however, these are expected to undergo revision. We therefore suggest that users regularly return to this page and check the "Modification History" at the end of this "READ_ME" file.

If used in presentations or publications:

We strongly suggest that Dr. Galvin (toni.galvin@unh.edu) be contacted to ensure that you are working with the latest release.

Please acknowledge STEREO PLASTIC Investigation (A.B. Galvin, PI) and NASA Contract NAS5-00132.

For reporting purposes, we request bibliography information for any publication, etc., using these data. Please send information on the use of these data to the PLASTIC PI:

Dr. A.B. Galvin
toni.galvin@unh.edu

If you have questions regarding data formats, please contact the PLASTIC Data System Manager:

Dr. Lorna Ellis
lorna.ellis@unh.edu

FILE FORMAT:

ASCII files are tab-delimited text.

File Naming convention:

STx_L2_PLA_Iron_Abundance_xhr_YYYY_Vxx.txt

Where:
"STx" is given as "STA" or "STB" for STEREO A and STEREO B, respectively.

"L2" indicates Level 2 data in the STEREO PLASTIC convention.

“PLA” indicates Plasma and Suprathermal Ion Composition (PLASTIC) Investigation.

“Iron” indicates solar wind iron data.

“Abundance” indicates abundances and kinetic properties (note: ”Iron_Q” files provide the charge state distributions).

“xhr” indicates the accumulation interval for the data (for example, if the iron data is derived from PLASTIC MR data accumulated over one hour, this data set would be designated “1hr”). “MR” is explained below.

“YYYY” represents the year.

“Vxx” indicates Version number, with the processing version given by the xx.

“txt” indicates ASCII file.

Missing data is given as -1E+31 (for floats) and -1 (for integers).

Parameters provided are:

| | |
|---|---|
| 1. Date and Time: | Cycle start time for first cycle in the data accumulation period (format yyyy-mm-dd/hh:mm:ss) |
| 2. q : | Iron charge state used in the v and vth fitting algorithm. |
| 3. vFe: | Bulk speed for solar wind Fe, [km/s], spacecraft frame. Derived from a 1D Maxwellian fit to the distribution function. |
| 3. vth_Fe: | Thermal speed derived for solar wind Fe, [km/s]. Derived from a 1D Maxwellian fit to the distribution function. |
| 4. n_Fe | Number density derived for solar wind Fe , [cm-3]. |
| 5. Fe/H (1E6) | Number density ratio derived for solar wind Fe and protons, scaled to 1E6. |
| 6-9. qf_xxx | Quality flags for above parameters. |

Quality flags:
0 = no identified issues
1 = caution: used second fit
2 = caution: low statistics
3 = caution: post acceleration less than nominal (efficiencies used for densities may be affected)
4 = wrong track selected, data deleted

5 = outlier, data deleted
6 = no peak found, or not within esa step/schn range, or otherwise not calculated

Please note that the Fe/H ratio uses the proton densities available at time of processing, which may not be finalized. The quality flag q_feh refers only to the Fe density quality, not the proton density quality.

STEREO PLASTIC IRON PARAMETERS:

The instrument's one minute measurement cycle consists of 128 logarithmically spaced energy-per-charge (E/Q) steps from ~80 keV/e down to ~0.3 keV/e. These are called ESA steps. Within each cycle, the instrument changes from the "main channel" aperture to a "small channel" aperture, with different geometric factors. The ESA step at which this change occurs is called the schan_switch. Due to unexpected issues involving the entrance system's variable geometric factor (Opitz, 2007), an extensive in-flight calibration (Simunac, 2009) and post-launch determinations with the engineering model have been performed. Solar wind iron is typically contained fully within the main channel geometric factor, and only main channel data are provided here.

Matrix Rate (MR) data consist of count rates in pre-defined species (mass, mass/charge) ranges that are calculated by table look-up in the onboard processing. Full resolution matrix rates (5-minute, 10-minute) covering major solar wind elements are provided to the public domain through the STEREO Science Center as Level-1 data sets.

Iron kinetic properties provided here are derived from the matrix rates associated with iron, that is, MR08 through MR11. The raw rates are converted into densities using the geometrical factor determined in pre-launch calibrations (see Karrer 2007 and Galvin et al. 2008). Iron detection efficiencies are based on internal efficiency ratios and the start efficiency. As iron was not an available species at the calibration facility, the start efficiency used here is based on argon data (see Galvin et al., 2008 for argon curves). This may affect the absolute density determination.

The Fe speed and thermal speed are derived from a 1D Maxwellian fit to the dominant peak in the MR09 matrix rate. The charge state of the peak used in the fitting process is derived from the proton speed.

Time series monthly plots provided include the color contour of the scaled distribution function (directly from the matrix rate MR09) as a function of speed, the bulk speed derived for Fe (brown line) and the proton speed (black line), the thermal speed derived for Fe, the scalar bulk speed difference (vFe – vH), the number density ratio of Fe/H (scaled by 1E6), and the total density of iron (brown) and protons (black). The dashed lines in the Fe/H plot indicate the range of photospheric Fe/H cited by Howeger (2001, in *Solar and Galactic Composition*).

Modification History
July 15, 2010 First issue of validated 2-hour data sets for STEREO A.